

Little League Shoulder

Osteochondrosis of the Proximal Humeral Epiphysis in Boy Baseball Pitchers

JOEL E. ADAMS, M.D., *San Bernardino*

■ *Roentgenographic changes consistent with osteochondrosis of the proximal humeral epiphysis were observed in five young baseball pitchers complaining of shoulder pain in the throwing arm. The symptoms and findings were quite similar to the previously reported involvement of the medial epicondylar epiphysis or "Little Leaguer's elbow."*

The act of throwing a baseball hard is an abnormal whip-like action which places a forceful repetitious traction strain on the shoulder joint.

Shoulder pain in youngsters engaged in organized competitive swimming programs can also be explained in this way.

Since these entities became evident with the establishment of organized baseball programs for boys in this age group, better medical supervision and rule changes to limit the amount of pitching until the epiphyses close, are urgently needed.

PAIN IN THE shoulder or elbow with attritional changes involving these joints is an accepted occupational hazard among professional baseball pitchers. Since the establishment of Little League and Pony League baseball programs for boys in the nine to 15 year age group, the vulnerable ununited epiphyses of young participants have been subjected to the same unusual repetitious strain demanded of adult pitchers.

"Little Leaguer's elbow" has become a common affliction. X-ray studies of elbows of 162 youngsters (previously reported) demonstrated this to be primarily a medial epicondylar epiphysitis or osteochondrosis commonly involving traction type epiphyses such as the tibial tubercle and os calcis as described by Osgood-Schlatter and Sever many years ago.

When the first young pitcher with shoulder pain came to the author's attention, an attempt to conduct a similar study of shoulders was unsuccessful, mainly because of apprehension on the part of managers, parents and youngsters that it might prevent the boys' pitching.

Although the proximal humeral epiphysis is not normally classified as a traction type, it assumes this status when one analyzes the role of the shoulder in the mechanism of the throwing act as required by a baseball pitcher. Like the handle of a whip, the shoulder acts as a stabilizing base for the forceful follow-through flail of the arm and forearm similar to a whiplash action. There are two separate sets of muscles playing a primary role in the throwing act. A heavy external group such as the pectoralis major, deltoid and triceps which attach to the humerus distal to the proximal epiphysis, and a finer internal group of ro-

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Reprint requests to: 1236 Waterman Avenue, San Bernardino, California 92404 (Dr. Adams).

tators—the supraspinatus, infraspinatus and subscapularis which attach to the tuberosity of the humerus proximal to the epiphysis. At the completion of the throw, there is a powerful drag or pull on the head of the humerus away from the glenoid fossa. This pulling force is transmitted through the proximal humeral epiphysis, subjecting it to an abnormally repetitious traction strain.

Pain in the shoulder which occurred only at the end of a hard throwing motion and which could not be accurately localized was the principal symptom in five boys who were examined. Results of physical examination of those patients were within normal limits except for obvious overdevelopment of the shoulder girdle muscles of the throwing arm, slight discomfort to firm digital pressure over the proximal humerus, and duplication of the pain by simulating the traction force of a hard pitch.

Comparative x-ray studies of both shoulders showed the following changes in the throwing arm: Widening of the proximal humeral epiphysis, demineralization and apparent fragmentation without evidence of avascular bone necrosis, and accelerated growth. These changes are consistent with local inflammatory reaction to repeated trauma. They are self-limiting and they subside rapidly with rest and avoidance of the aggravating trauma, which is probably the reason not many youngsters with shoulder pain seek medical attention.

Because of the absence of bone necrosis, Goff⁵ has classified these transient changes as false osteochondroses as distinguished from true osteochondroses involving pressure type epiphyses such as occur in the hip in Legg Perthes syndrome, in the tarsal navicular in Kohler's disease, and in the metatarsal head in Frieberg's disease.

In evaluating the findings noted in the five previously mentioned cases, it became obvious that the frequent complaint of shoulder pain among youngsters engaged in organized competitive swimming programs could also be explained on the same basis. These programs, like baseball, are sometimes over-enthusiastically conducted, requiring from one to two hours of maximum effort daily, seven days a week, over and above normal recreational swimming. The various competitive swim strokes not only put a repetitious traction strain on the proximal humeral epiphysis but also on the epiphyses of the coracoid and acromial processes of the scapula to which are

attached the short head of the biceps, the coracobrachialis and the deltoid muscles.

Haas has generally been credited with having described osteochondritis of the head of the humerus in 1921, but in a thorough search of the literature no publication on the subject was found. In 1953 Dotter⁴ reported a case of a 12-year-old Little League pitcher with shoulder symptoms and roentgenographic changes identical to those in the first of the five patients reported upon herein. However, because of the void in the literature on the subject and lack of a better explanation, Dotter diagnosed the lesion as a fracture through the epiphyseal cartilage.

Reports of Cases

CASE 1—A 13-year-old left-handed pitcher had pitched one year of Little League and was trying out for Pony League when he began having left shoulder pain when he threw hard. After three weeks, the pain became so severe he had to stop pitching and he then sought medical advice.

On examination the shoulder joint showed a complete range of painless motion with very slight tenderness to deep pressure over the proximal humerus. The shoulder pain could be induced by jerking on the outstretched arm in a way that simulated the completion of a hard throw. The patient was reluctant to go through the throwing motion voluntarily because of anticipated pain. Comparative x-ray studies of both shoulders (Figure 1) showed demineralization and decided widening of the epiphyseal line in the pitching arm.

Treatment consisted simply of discontinuing playing for the remainder of the season. The

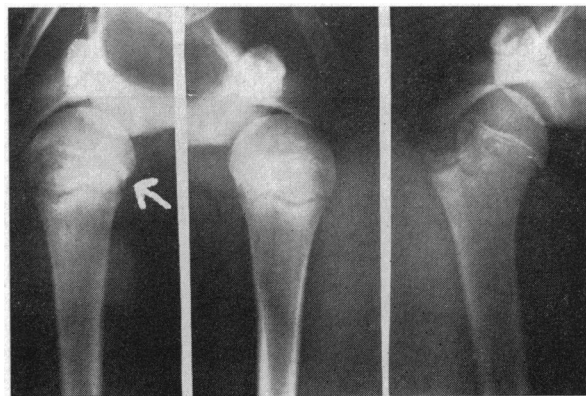


Figure 1.—(Case 1) Film at left shows decided widening and demineralization of proximal humeral epiphysis (arrow) in the left arm as compared with the right arm, shown in center frame. The right frame shows healing of the affected arm after several months' rest.

symptoms were completely relieved and the roentgenographic appearance of the proximal humeral epiphysis became essentially normal. The patient was advised not to resume pitching until the epiphyses closed but was told he might play other positions and engage in other sports.

CASE 2—A 14-year-old right-handed pitcher who had pitched since age nine and played outfield and catcher on days he was not pitching, began to have pain in the right shoulder when throwing hard. It gradually became more severe and finally he had to stop playing. He had been treated for Osgood Schlatter's disease at age 12, which indicated a pre-disposition to epiphyseal involvement. On physical examination overdevelopment of the right shoulder girdle muscles was noted and pain was evoked on simulation of a hard throwing motion.

Comparative x-ray films (Figure 2) showed widening of the epiphyseal line and fragmentation. With complete rest from throwing, the shoulder pain subsided and x-ray films several months later showed return to normal appearance of the proximal humeral epiphysis. The patient resumed playing ball but was told not to pitch until the epiphyses had closed.

CASE 3—A 15-year-old left-handed pitcher who had pitched for five years and played first base on days he was not pitching, began to have shoulder pain when he started practice at the beginning of the season. Pain was felt in both the front and back of the shoulder but only at the end of a hard throwing motion. Pain gradually became severe enough to force the patient to stop throwing and to seek medical attention. On physical examination overdevelopment of the shoulder girdle muscles of the throwing arm was

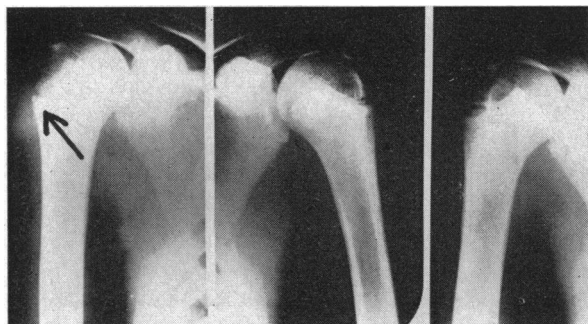


Figure 2.—(Case 2) Widening and fragmentation of the proximal humeral epiphysis (arrow) as compared with the opposite arm in center frame. Film on right shows healing after several months' rest.

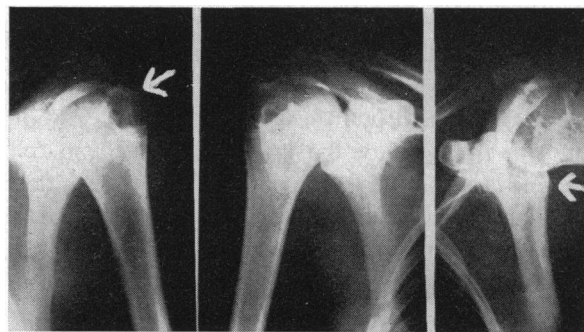


Figure 3.—(Case 3) Deformity and demineralization of the greater tuberosity of the humerus (arrow) and widening of the proximal humeral epiphysis as compared with the opposite arm (center frame). Film at right shows exostosis (arrow) from the postero-inferior margin of the glenoid fossa.

noted and discomfort was evoked by firm digital pressure over the greater tuberosity of the humerus and also in the postero-inferior glenoid region. Comparative x-ray films (Figure 3) showed widening of the proximal epiphysis, deformity and demineralization of the greater tuberosity and exostosis from the postero-inferior margin of the glenoid fossa. (The latter lesion, one that is commonly found in professional pitchers, is a reaction to repeated traction stress at the attachment of the long head of the triceps and posterior capsule.) The patient was advised to rest the arm until the symptoms subsided and to play first base if he intended to continue in baseball.

CASE 4—A 13-year-old right-handed pitcher had pitched one year in Little League, had played outfield on days not pitching and admitted considerable throwing practice at home when not playing. When he was trying out for pitcher at the beginning of the season, his shoulder began to hurt and finally became so painful that he quit pitching and stopped playing ball entirely for a time but did not seek medical attention. Three months later, he was talked into reporting for examination by one of the other patients because he was still having some discomfort when he tried to throw hard.

On physical examination the only abnormality observed was overdevelopment of the shoulder girdle muscles of the throwing arm. Comparative x-ray studies of the shoulders (several weeks after he had quit pitching) showed no significant change in the proximal humeral epiphysis. Quite striking, however, was the accelerated growth of the hu-

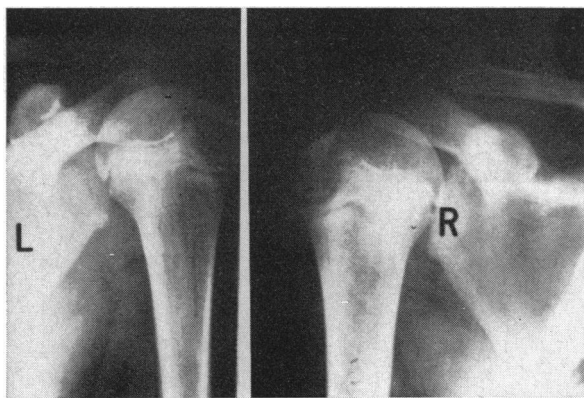


Figure 4.—(Case 4) Pronounced acceleration of growth of the right humerus as compared with opposite arm.

merus as compared with the opposite arm (Figure 4). The patient was told that he might play other positions but was advised not to resume pitching until the epiphyses had closed.

CASE 5—A 15-year-old right-handed pitcher was seen several weeks after he had voluntarily stopped pitching because of shoulder pain. He had been pitching since age nine and had also experienced elbow pain in previous years.

On examination overdevelopment of the shoulder muscles of the throwing arm was noted. There was no demonstrable localized tenderness. Comparative x-ray films showed slight residual widening and demineralization of the proximal humeral epiphysis. He was advised not to pitch again until the epiphyses had closed but was told he might play other positions.

Conclusions

Roentgenographic changes and a clinical course characteristic of osteochondrosis of the proximal humeral epiphysis identify this condition as the cause of shoulder pain in boy baseball pitchers. This new entity, like the much more common "Little League elbow" involving the medial epicondylar epiphysis, has developed since the establishment of organized baseball programs in the nine to 15 year age group. Because the shoulder pain is felt only at the end of a hard throwing motion, rapid recovery results when the youngster stops pitching. As he usually stops voluntarily, medical attention is not often needed, which explains the dearth of the medical literature on the subject.

When the rules regulating the amount of throwing by pitchers in the Little and Pony Leagues

were drafted, there was no definite medical knowledge available as to what effect the abnormal repetitious throwing motion that is required of pitchers would have on the ununited epiphyses of the arm. Unfortunately, despite the subsequent accumulation of medical evidence demonstrating the need for further protection of the young pitching arms, there has been a reluctance, especially on the part of Little League administrators, to alter the present rules.

After an extensive study of the so-called Little Leaguer's elbow, the following recommendations were made by the author and it appears that they bear repeating as applicable to similarly caused pain in the shoulder.

- Restrict pitchers in Little League to two innings and in Pony League to three innings per game.
- Encourage pitchers to report shoulder or elbow pain immediately and to discontinue pitching (although playing in other positions) until the epiphyses are closed.
- Advise pitchers not to practice at home before, during or after the baseball season, as excessive throwing invites trouble rather than perfection at this age.
- Abolish curve ball throwing at this age, as it not only puts additional strain on the arm but requires excessive throwing practice to perfect.
- Establish medical advisory boards at national and local levels, and persuade coaches not to try to treat or to recommend a method of treating sore pitching arms.

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